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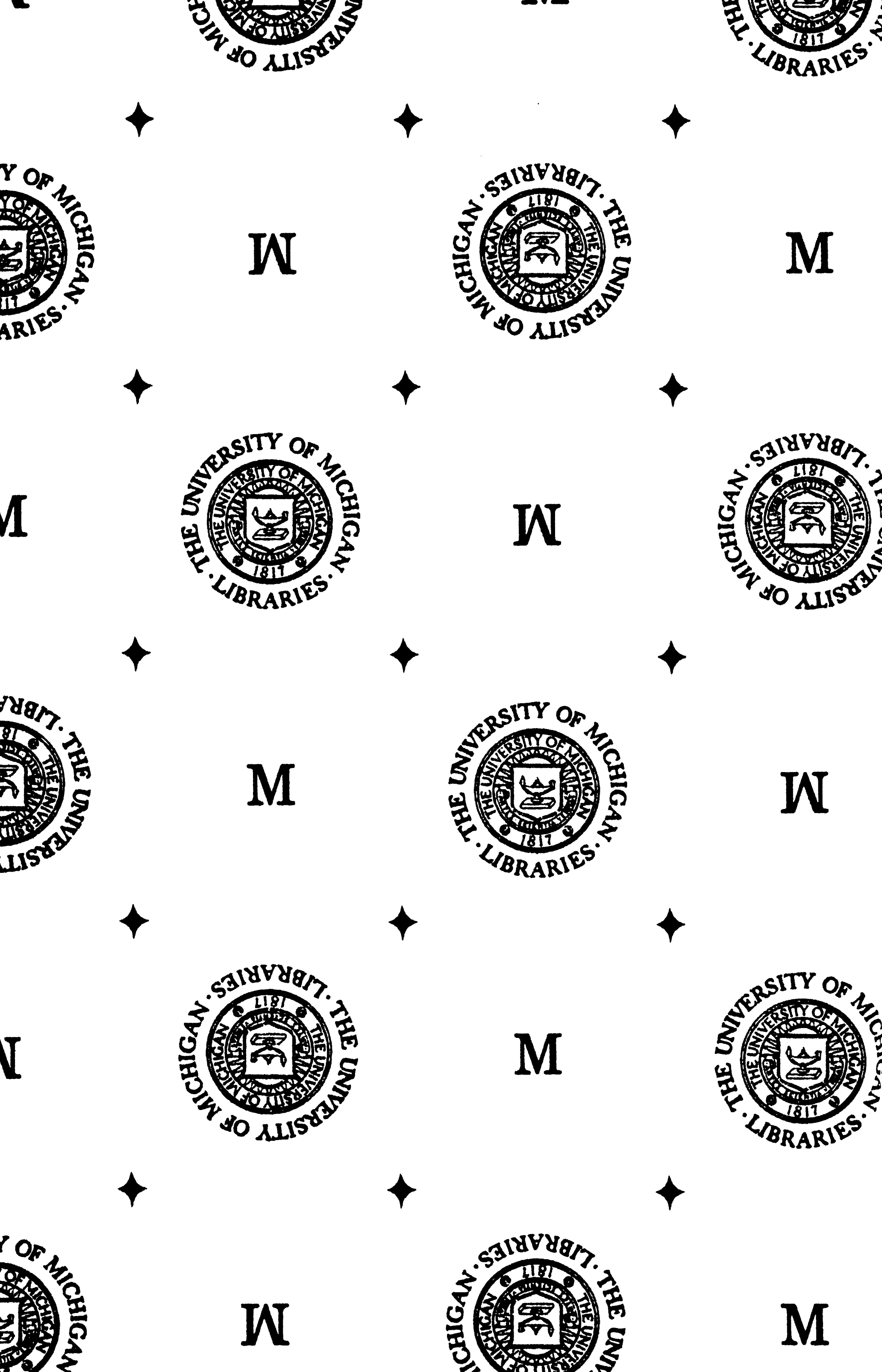

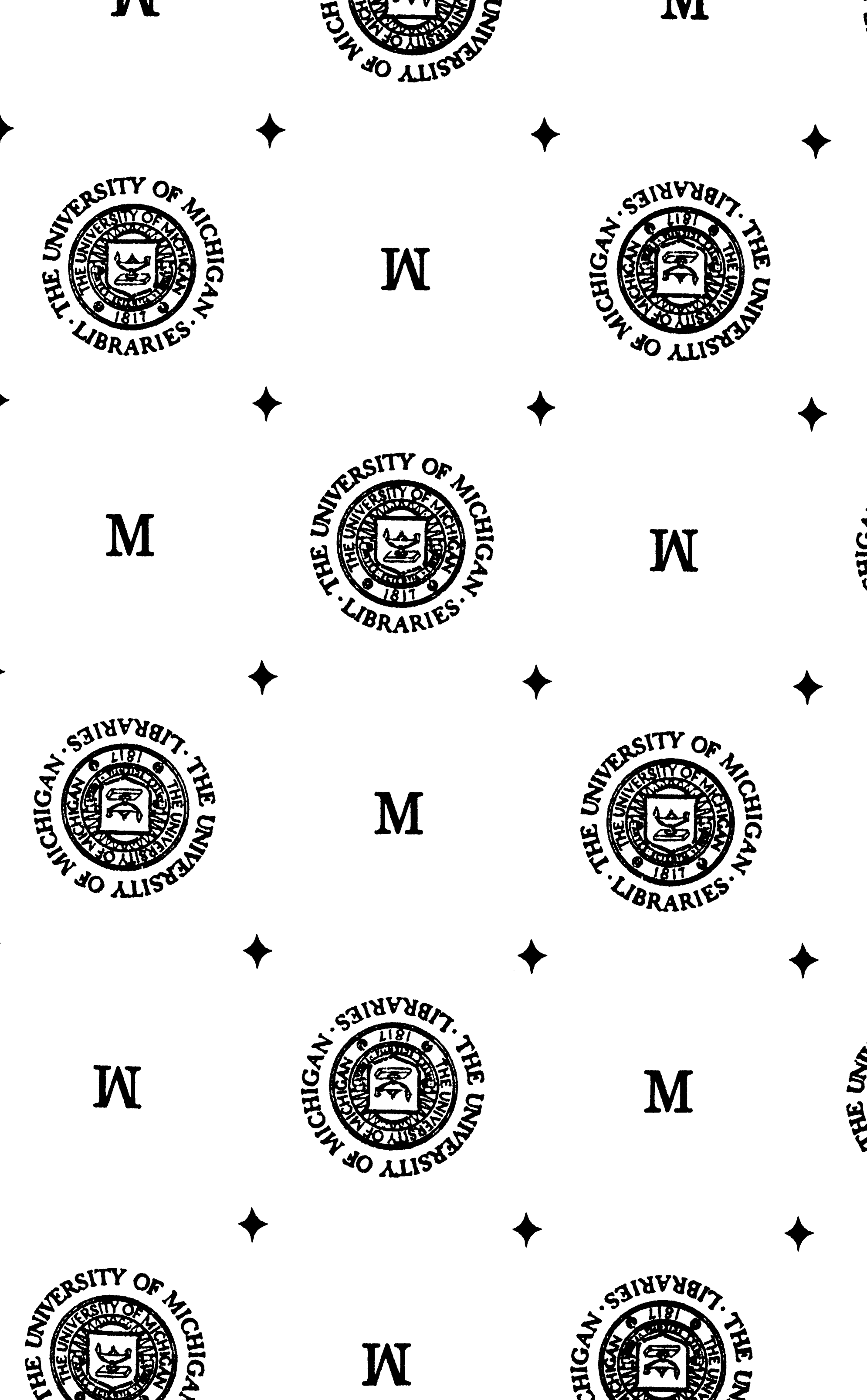
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GOVERNMENT OF PORTO RICO
DEPARTMENT OF AGRICULTURE AND LABOR.
INSULAR EXPERIMENT STATION.

CIRCULAR No. 85

THE DISTRIBUTION

OF THE

PINK BOLLWORM

IN

PORTO RICO

BY

GEORGE N. WOLCOTT

SAN JUAN, P. R.
BUREAU OF SUPPLIES, PRINTING, AND TRANSPORTATION
SEPTEMBER, 1923

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DISTRIBUTION OF THE PINK BOLLWORM IN PORTO RICO.

By GEORGE N. WOLCOTT.

The discovery of the presence of the pink bollworm of cotton, *Pectinophora gossypiella* Saunders, at Humacao in July 1921, the determination immediately thereafter that it was present throughout the important cotton-growing sections of Porto Rico, and the methods of control as worked out in other countries have been discussed in a previous circular by the members of the department ("La Oruga Rosada de la Cápsula del Algodón en Puerto Rico," by G. N. Wolcott, J. D. More and F. Seín, Jr., Circular No. 63, Insular Experiment Station, Río Piedras, P. R., pp. 1–11, fig. 4, October 1921). The distribution of the pink bollworm in Porto Rico up to the spring of 1922, as determined by extensive examinations of cotton bolls from all parts of the Island, showing that it was found not only in the important cotton section, Aguadilla to Arecibo, but also along the entire eastern and southern coasts, from the beach at Mameyes and Luquillo in the northeastern corner to Cabo Rojo in the southwestern corner, has also been been given ("The Distribution of the Pink Bollworm of Cotton, *Pectinophora gossypiella* Saunders, in Porto Rico," by George N. Wolcott, in Jour. Ec. Ent., Vol. 15, pp. 313–314, map, August 1922, and *in* "Report of the Division of Entomology," by G. N. Wolcott, p. 48, Ann. Rpt. Insular Expt. Station, Río Piedras, P. R., 1923).

The accurate determination of the extreme limits of the distribution of the pink bollworm at that time becomes of more especial importance now, as it was followed by another survey in the following winter and spring (1922–23), the results of which are shown on the accompanying map. The purpose of the second survey was to obtain comparative data on how the spread of the pink bollworm is affected by (1) the continued presence of a few cotton plants as compared with the destruction of large numbers of plants in the commercial cotton-growing sections of the Island, (2) the direction of wind and (3) the climatic differences of the north and south sides of the Island.

In the spring of 1922, the infestation was practically confined to the coast or its immediate vicinity. The eastern half of the

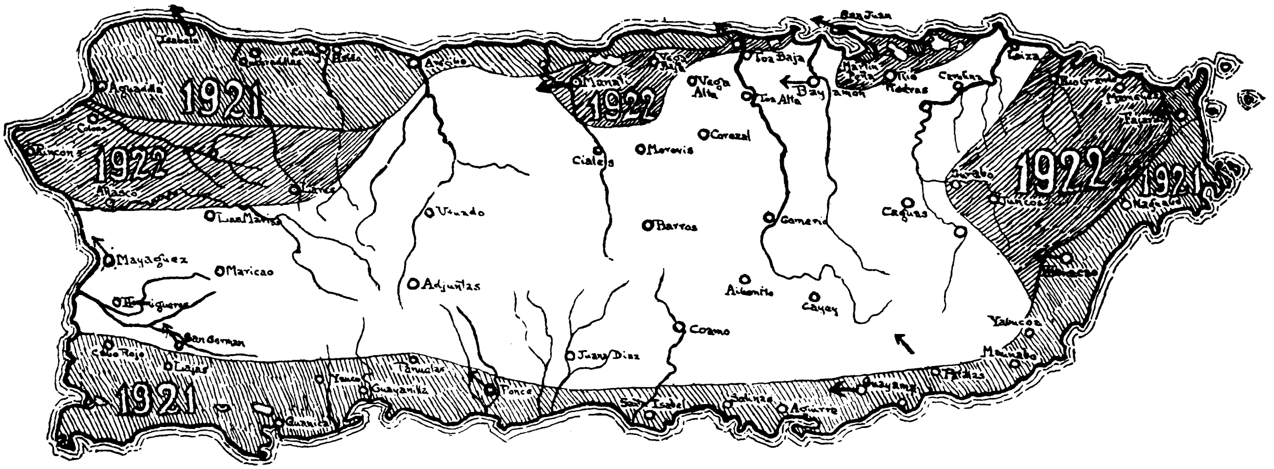

FIG. 1.—The distribution of the pink bollworm, *Pectinophora gossypiella* Saunders, in Porto Rico, at the end of the year 1921, shown by shading from northwest to southeast, and its dispersion during the year 1922, shown by shading from northeast to southwest. Direction of prevailing winds, as reported by the United States Weather Bureau, shown by arrows flying with the wind. (Original.)

north side of the Island, except for a few bushes around the gin at Martin Peña and a few others at Pt. Cangrejos (west of Loíza) planted with seed from the gin, was free from the pink bollworm, as was also the west coast except for the commercial plantings at Lajas, Boquerón and Cabo Rojo on the south and those at Aguadilla on the north. The south and east coasts were entirely infested, but a few miles back in the mountains no injured bolls could be found. The only place where the pink bollworm had gone into the mountainous region was south of the largest cotton district, in the northwestern corner of the Island, and here it was fifteen kilometers from the coast at Bayaney on the east and at Moca on the west.

A year later, the entire north coast is infested, except around Bayamón and Cataño, and around Carolina, Canovanas and Loíza. The dispersion from the infestation around the gin at Martin Peña and at Pt. Cangrejos was not stimulated by the destruction of the infested plants and may be considered a normal dispersion, not large in extent nor serious in intensity. At Pueblo Viejo (between Río Piedras and Bayamón) one heavily infested bush and many lightly infested were noted, and it is possible that the heavily infested bush does not represent normal dispersion, but the planting of infested seed. It is possible also that the infestation at Pt. Salinas or Plantaje (north, northwest of Bayamón) where a group of heavily infested old trees with many lightly infested plants to the west and south, but none infested to the east, represents the dispersion from the group of old trees, which were not observed in 1921 and were possibly infested at that time. West of Pt. Salinas, the infestation along the coast is now continuous, but does not extend south into the hills, and not as far up the Toa Valley as Toa Baja.

Although the coast plantations near Vega Baja and Manatí, north of the Laguna de Tiburones, were lightly infested a year ago the destruction of these infested plants and those of one commercial planting west of Vega Baja has extended the infestation at these points far to the south, although it does not yet reach the Ciales–Morovis road. Between Manatí and Arecibo, the extreme southern limit of the dispersion is two kilometers south of the main road, on the road to Florida. South of Arecibo on the road to Utuado no infested plants could be found. But to the south of the Arecibo–Aguadilla district the spread has been considerable, being in fact even greater than noted on the map. In April 1923, Mr. F. Seín found one infested boll on the Lares–Yauco road, eight kilometers south of Lares, and the infestation at Rincón and Añasco which was doubtful in 1921, is now quite severe. The much greater extent of its spread here and south of Vega Baja and Manatí than elsewhere along the north coast is doubtless due to the destruction of the old cotton plants in commercial plantations, which stimulates the moths to make more extensive flights.

It will be noted that except around Pt. Salinas, this dispersion is not appreciably aided by the winds. On the east coast, however, the wind is undoubtedly responsible for a more extensive distribution than elsewhere. The infestation of trees and bushes along this coast was the most severe of any uncultivated cotton, that on the wild plants on the beach at Maunabo being so intense as to suggest that they might possibly represent the first infestation in Porto Rico, either from seed washed ashore from St. Croix, or moths blown ashore from this Island, which is here nearest to Porto Rico. From observations made after the map was drawn, it is now known that the dispersion west of Humacao is as great as west of Fajardo, so that the line between Loíza and Río Grande may be projected beyond Gurabo to run southeast of Caguas and approaching Cayey. No infested or even suspicious bolls have been found between Cayey and Aibonito, or between Cayey and Guayama, but suspicous bolls were found east of Cayey, and one unquestionably infested old boll at kilometer 45, hectare 8 on the road between Cayey and Caguas. The infestation is still rather slight around San Lorenzo, Gurabo and Juncos, but at Río Blanco (west of Naguabo) close up under the Luquillo mountain range, the few plants found were heavily infested. On the contrary, to the north of the mountains at Santa Catalina (three or four miles south of Mameyes) several cotton plants were free from pink bollworm injury and doubtless the entire forest reserve of the Luquillo mountains should be left blank because no cotton plants are present in it.

The dispersions noted have all been in regions of more abundant rainfall and mark the contrast with the arid and semi-arid conditions of the south coast. The high mountains are much nearer to this coast than on the north side, but even where there are no mountains to prevent the dispersion, as between Fortuna and Juana Díaz, none has occurred. Nor has there been any dispersion up the southern slopes of the mountains, between Ponce and Adjuntas, or north of Yauco, and plants repeatedly examined between San Germân, Hormigueros and Mayagüez have remained uninfested. The pink bollworm thrives even under the most arid conditions, as the very heavy and destructive infestation in the commercial plantings south of Boquerón, in one of the dryest sections of the Island, indicates, but apparently it does not disperse by flight of the moths under arid conditions, except for very short distances, even with favorable conditions of wind and topography.

From observations in Porto Rico, it appears that (1) normal dispersion by flight of the moths of the pink bollworm is greater in extent from commercial plantings of cotton than from scattered wild plants, (2) it is to some extent aided by winds and (3) it is almost, if not entirely, prevented by arid or semi-arid conditions.

From the live material obtained in making the above observations Mr. J. D. More has found that twenty per cent of the larvae collected from January to April have a resting stage averaging 128 days in length, the maximum period being 185 days, the minimum 42 days. This permits the moths from such caterpillars to emerge in June, July and August, rather than in February to April as did the eighty per cent. None of the larvae collected in September and October had a resting period, but all transformed to pupae and adults emerged in October and November.

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